

# MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

## Switch-mode Power Rectifiers 30 V, 30 A

### Features and Benefits

- Low Forward Voltage
- Low Power Loss/High Efficiency
- High Surge Capacity
- 150°C Operating Junction Temperature
- 30 A Total (15 A Per Diode Leg)
- Guard-Ring for Stress Protection
- NRVBB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

### Applications

- Power Supply – Output Rectification
- Power Management
- Instrumentation

### Mechanical Characteristics:

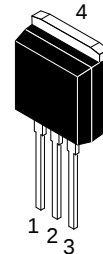
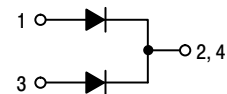
- Case: Epoxy, Molded
- Epoxy Meets UL 94 V-0 @ 0.125 in
- Weight: 1.5 Grams (I<sup>2</sup>PAK) (Approximately)  
1.9 Grams (TO-220) (Approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:  
260°C Max. for 10 Seconds



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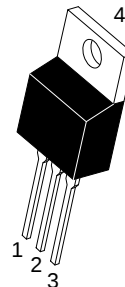
[www.onsemi.com](http://www.onsemi.com)

## SCHOTTKY BARRIER RECTIFIER 30 AMPERES, 30 VOLTS

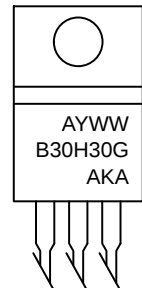


I<sup>2</sup>PAK (TO-262)  
CASE 418D  
STYLE 3

### MARKING DIAGRAMS



TO-220  
CASE 221A  
STYLE 6



A = Assembly Location  
Y = Year  
WW = Work Week  
B30H30 = Device Code  
G = Pb-Free Package  
AKA = Diode Polarity

### ORDERING AND MARKING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

# MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

## MAXIMUM RATINGS (Per Diode Leg)

| Rating                                                                                                     | Symbol                          | Value           | Unit             |
|------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------|------------------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage                     | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 30              | V                |
| Average Rectified Forward Current<br>(Rated $V_R$ , $T_C = 138^\circ\text{C}$ )                            | $I_{F(AV)}$                     | 15              | A                |
| Peak Repetitive Forward Current<br>(Rated $V_R$ , Square Wave, 20 kHz)                                     | $I_{FRM}$                       | 30              | A                |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions halfwave, single phase, 60 Hz) | $I_{FSM}$                       | 260             | A                |
| Operating Junction Temperature (Note 1)                                                                    | $T_J$                           | -55 to +150     | $^\circ\text{C}$ |
| Storage Temperature                                                                                        | $T_{stg}$                       | -55 to +150     | $^\circ\text{C}$ |
| Voltage Rate of Change (Rated $V_R$ )                                                                      | $dv/dt$                         | 10,000          | V/ $\mu\text{s}$ |
| Controlled Avalanche Energy (see test conditions in Figures 9 and 10)                                      | $W_{AVAIL}$                     | 250             | mJ               |
| ESD Ratings:<br>Machine Model = C<br>Human Body Model = 3B                                                 |                                 | > 400<br>> 8000 | V                |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The heat generated must be less than the thermal conductivity from Junction-to-Ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ .

## THERMAL CHARACTERISTICS

| Rating                                                                | Symbol                             | Value     | Unit               |
|-----------------------------------------------------------------------|------------------------------------|-----------|--------------------|
| Maximum Thermal Resistance<br>Junction-to-Case<br>Junction-to-Ambient | $R_{\theta JC}$<br>$R_{\theta JA}$ | 2.0<br>70 | $^\circ\text{C/W}$ |

## ELECTRICAL CHARACTERISTICS (Per Diode Leg)

| Rating                                                                                                                                                                                                                                                                   | Symbol | Value                        | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|------|
| Maximum Instantaneous Forward Voltage (Note 2)<br>( $I_F = 15\text{ A}$ , $T_C = 25^\circ\text{C}$ )<br>( $I_F = 15\text{ A}$ , $T_C = 125^\circ\text{C}$ )<br>( $I_F = 30\text{ A}$ , $T_C = 25^\circ\text{C}$ )<br>( $I_F = 30\text{ A}$ , $T_C = 125^\circ\text{C}$ ) | $V_F$  | 0.48<br>0.40<br>0.55<br>0.53 | V    |
| Maximum Instantaneous Reverse Current (Note 2)<br>(Rated DC Voltage, $T_C = 25^\circ\text{C}$ )<br>(Rated DC Voltage, $T_C = 125^\circ\text{C}$ )                                                                                                                        | $I_R$  | 0.8<br>130                   | mA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

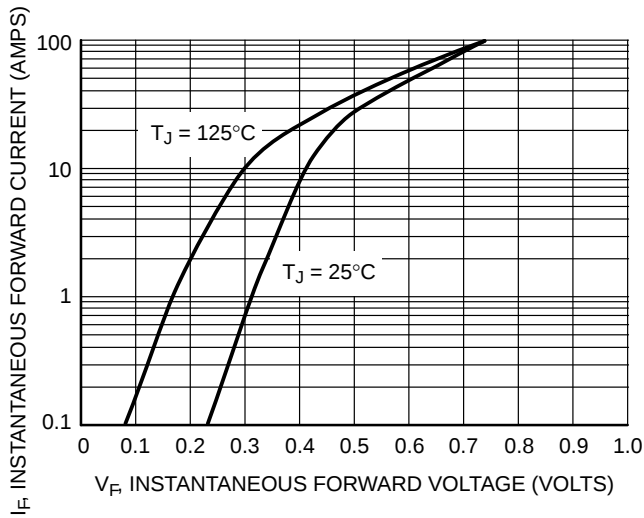


Figure 1. Typical Forward Voltage

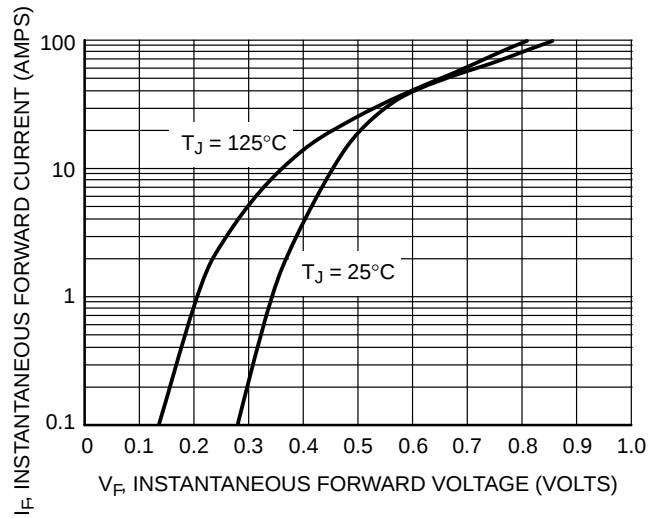


Figure 2. Maximum Forward Voltage

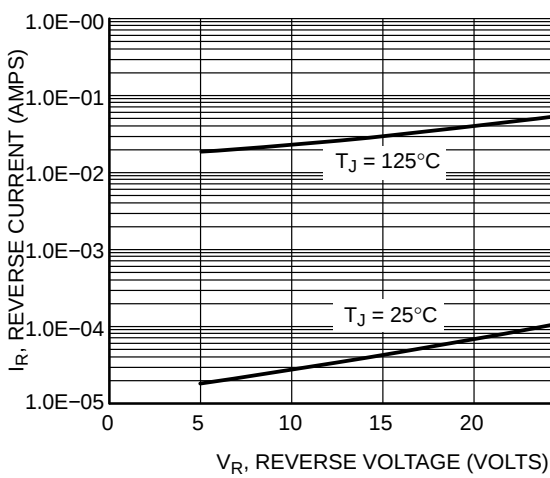


Figure 3. Typical Reverse Current

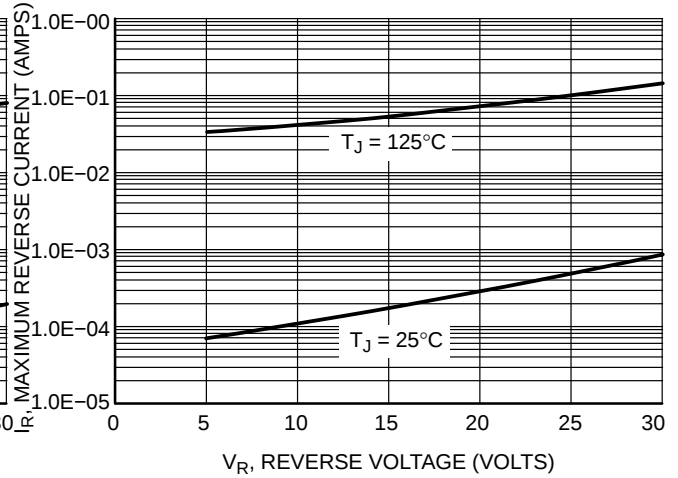


Figure 4. Maximum Reverse Current

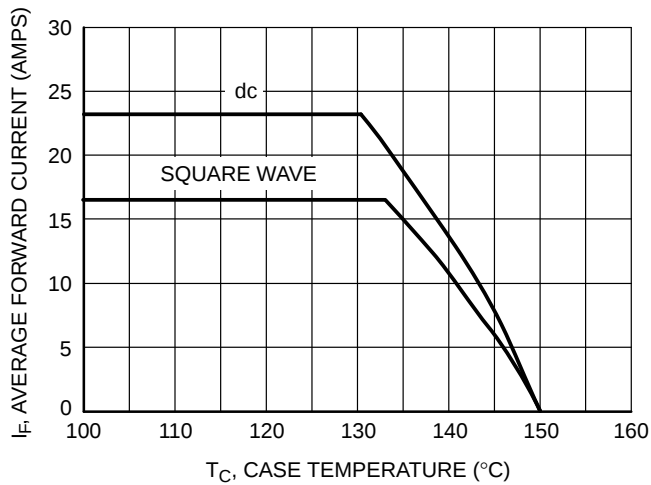


Figure 5. Current Derating

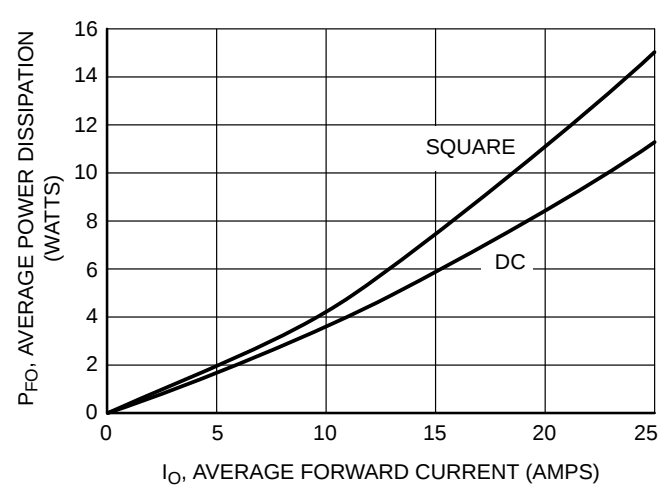


Figure 6. Forward Power Dissipation

# MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

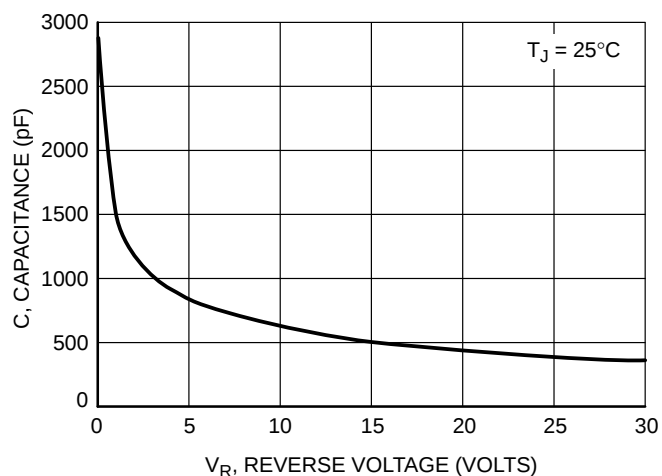


Figure 7. Typical Capacitance

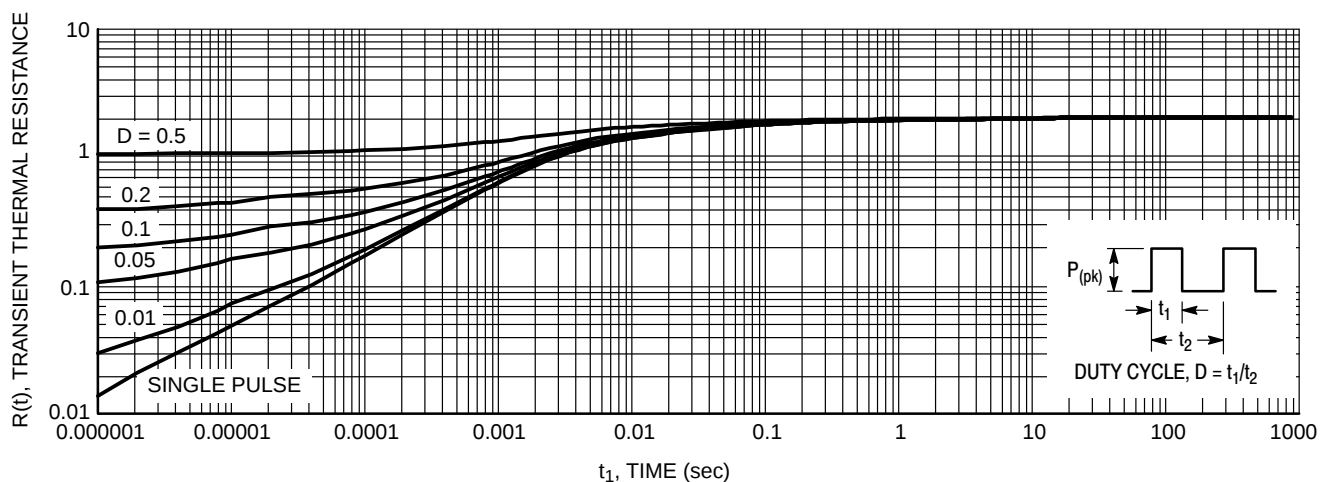


Figure 8. Thermal Response Junction-to-Case

## MBRB30H30CT-1G, NRVBB30H30CT-1G, MBR30H30CTG

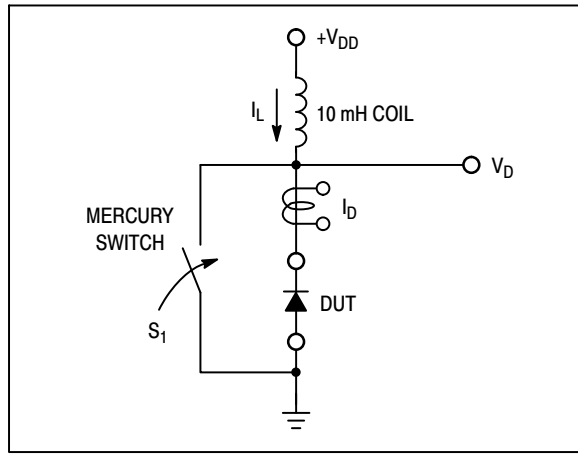


Figure 9. Test Circuit

The unclamped inductive switching circuit shown in Figure 9 was used to demonstrate the controlled avalanche capability of this device. A mercury switch was used instead of an electronic switch to simulate a noisy environment when the switch was being opened.

When  $S_1$  is closed at  $t_0$  the current in the inductor  $I_L$  ramps up linearly; and energy is stored in the coil. At  $t_1$  the switch is opened and the voltage across the diode under test begins to rise rapidly, due to  $di/dt$  effects, when this induced voltage reaches the breakdown voltage of the diode, it is clamped at  $BV_{DUT}$  and the diode begins to conduct the full load current which now starts to decay linearly through the diode, and goes to zero at  $t_2$ .

By solving the loop equation at the point in time when  $S_1$  is opened; and calculating the energy that is transferred to the diode it can be shown that the total energy transferred is equal to the energy stored in the inductor plus a finite amount of energy from the  $V_{DD}$  power supply while the diode is in breakdown (from  $t_1$  to  $t_2$ ) minus any losses due to finite component resistances. Assuming the component resistive

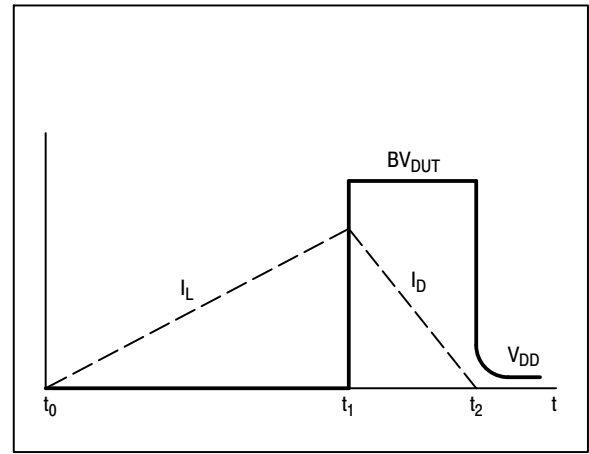


Figure 10. Current-Voltage Waveforms

elements are small Equation (1) approximates the total energy transferred to the diode. It can be seen from this equation that if the  $V_{DD}$  voltage is low compared to the breakdown voltage of the device, the amount of energy contributed by the supply during breakdown is small and the total energy can be assumed to be nearly equal to the energy stored in the coil during the time when  $S_1$  was closed, Equation (2).

EQUATION (1):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2 \left( \frac{BV_{DUT}}{BV_{DUT} - V_{DD}} \right)$$

EQUATION (2):

$$W_{AVAL} \approx \frac{1}{2} L I_{LPK}^2$$

### ORDERING INFORMATION

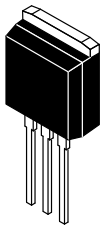
| Device          | Package             | Shipping        |
|-----------------|---------------------|-----------------|
| MBRB30H30CT-1G  | TO-262<br>(Pb-Free) | 50 Units / Rail |
| NRVBB30H30CT-1G | TO-262<br>(Pb-Free) | 50 Units / Rail |
| MBR30H30CTG     | TO-220<br>(Pb-Free) | 50 Units / Rail |

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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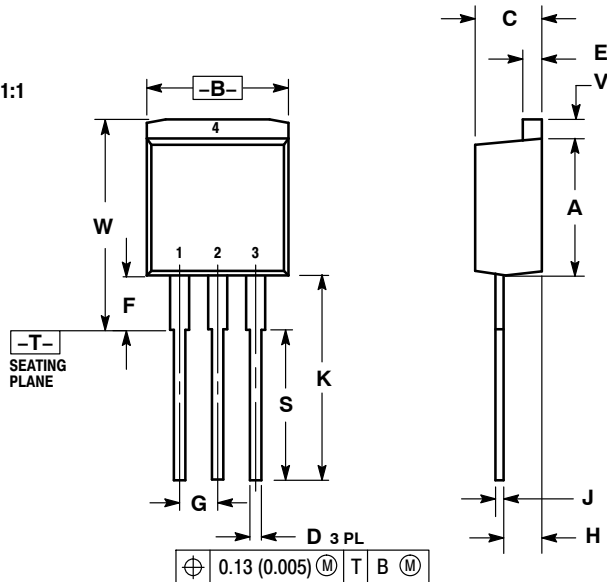
ON



SCALE 1:1

I<sup>2</sup>PAK (TO-262)  
CASE 418D-01  
ISSUE D

DATE 16 OCT 2007



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.335     | 0.380 | 8.51        | 9.65  |
| B   | 0.380     | 0.406 | 9.65        | 10.31 |
| C   | 0.160     | 0.185 | 4.06        | 4.70  |
| D   | 0.026     | 0.035 | 0.66        | 0.89  |
| E   | 0.045     | 0.055 | 1.14        | 1.40  |
| F   | 0.122 REF |       | 3.10 REF    |       |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.094     | 0.110 | 2.39        | 2.79  |
| J   | 0.013     | 0.025 | 0.33        | 0.64  |
| K   | 0.500     | 0.562 | 12.70       | 14.27 |
| S   | 0.390 REF |       | 9.90 REF    |       |
| V   | 0.045     | 0.070 | 1.14        | 1.78  |
| W   | 0.522     | 0.551 | 13.25       | 14.00 |

STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

STYLE 2:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

STYLE 3:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

STYLE 4:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

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DESCRIPTION: I<sup>2</sup>PAK (TO-262)

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